FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.

Oct. 16–21 Daily Mail £1,000 Gliding Competition

Nov. 30 .... Closing date for FLIGHT Designing Competition

Dec. 15–Jan. 2 Paris Aero Exhibition

1923.

June .... International Air Congress, London

Dec. 1 .... Entries close for French Aero Engine Competition

1924.

Mar. 1 .... French Aero Engine Competition

Mar. 15 .... Entries close for Dutch Height Indicator Competition

EDITORIAL COMMENT.

ELSEWHERE in this issue of FLIGHT we publish a *résumé* of a lecture given by General Sir Sefton Brancker, Director of Civil Aviation, before the Overseas League. Sir Sefton was speaking to an audience not intimately connected with, nor, presumably, in very close touch with aviation, and in his lecture he, therefore, covered a good deal of ground which has already been thoroughly traversed by himself and others on various occasions. The D.C.A., however, made one or two remarks which appear to call for comment. Thus, his announcement that it is proposed to establish five or six civilian flying schools for the training of officers of the R.A.F. Reserve will be received with considerable satisfaction. General Brancker's actual words were somewhat vague, but if we interpret them correctly, his idea is that these civilian schools will train a certain number of reserve officers, the cost of such training to be borne by the R.A.F., and that while the Government assistance thus afforded will keep the schools going, it will also enable them (the schools) to train civilians, possibly at a lower rate, and thus provide an extra reserve of pilots against emergencies. This is all to the good, and indicates a return to the old days before the War, when our civilian flying schools did such valuable service in training the men who, during the period of greatest stress, became the very backbone of our R.F.C. and R.N.A.S. Just as from those early pilots, trained at our civilian flying schools, was formed the nucleus of our flying personnel, which grew during the War to such gigantic proportions, so the Government assistance to civilian flying schools now promised will enable us to found a reserve from which, in case of future need, may be drawn the pilots, instructors and mechanics who are to teach the new generation.

General Sir Sefton Brancker on Air Transport

Another statement made by General Brancker is, we think, entitled to special notice, dealing as it does with a fact which, although realised in a more or less vague way, is somewhat likely to be lost sight of. He pointed out that in the past great Empires remained great only so long as they gave due consideration to the question of good communications.

When these were allowed to decline the Empires appeared to decline with them. From this undisputed fact General Brancker drew the conclusion that it was reasonable to suppose that the next few years might see the British Empire kept together by air transport. The personal contact between those in high places will do much more towards good will and understanding than reams of written documents, and it is in strengthening this personal element that aviation has so much to offer, much more, probably, than is generally realised.

Speaking as a member of the International Convention on Air Navigation, Sir Sefton Brancker said: "There is more mutual trust and real co-operation between nations on that Convention than on any other. There is a spirit about aviation which tends to co-operation instead of eternal bickering and fighting over small points, and I am not at all sure that the International Convention will not be one of the biggest weapons for peace of the League of Nations. This statement was received with cheers, and to these we would all add our voice.

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A League of Nations Air Force

Not untirely unconnected with Sir Sefton Brancker's statement on the importance of the International Air Convention and on its importance to the League of Nations is Lord Robert Cecil's suggestion that an Air Force of the League of Nations should be formed to make the guarantees effective. Both statements are indications of the growing realisation of the vast possibilities, as yet barely touched upon, of the Air Arm. A strong League Air Force would be one of the very best means of assuring that no member of the League would foolishly attempt aggression against any other member of the League. The very presence of such an Air Force would act as a deterrent, while, if in spite of its existence, any nation should take aggressive steps, the air, sea and land forces of the nation so attacked would naturally join forces with the League Air Force, and thus might avoid the necessity for any other measures being taken by the League. Added to this effectiveness of a League Air Force, it should not be forgotten that even a very large Air Force could be maintained at relatively trifling cost, at any rate, compared with the expenses involved in many nations maintaining at strength their respective fighting services. Thus, expenditure on armaments could be reduced all around, and at the same time the maintenance of units serving with the League Air Force would ensure a standing and ever ready force, prepared to strike at any moment when such action should prove necessary. From every point of view Lord Robert's suggestion appears to us to be worthy of the most serious consideration, and we sincerely hope that the necessary action to that end may be initiated without delay.

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D. of R. and Farnborough

As first announced in FLIGHT several months ago, it was decided to transfer a large portion of the establishment of the Directorate of Research to the Royal Aircraft Establishment at Farnborough. This transfer has now been effected, and an official statement on the subject suggests that it is expected that very considerable economies will result, as well as a closer co-operation between the Directorate of Research and the practical experimental work carried out at the R.A.E.

When we first heard of this intention we pointed out that it might be that the move was actuated by a genuine desire for economy, but that on the other hand it might mean the first step towards a return to the old evil days when the Royal Aircraft Factory (as it was then called) performed functions in the way of design and construction for which it was never intended, and which could not be tolerated. Whilst we trust that no such plans are even remotely entertained now, the concentration of research and experiment at Farnborough appears to carry with it the danger that the "Factory" may again have plans for more designing and constructional work than will be good for the country or the industry, which should not be allowed. May we call attention to a statement made by the Director of Research at the last Air Conference, in which he pointed out that his department was about one-fifth research and four-fifths engineering? Professor Bairstow very rightly pointed out that if that were the case it would appear to be time for changing the name of the department. As we have said, we do not know that there is necessarily anything more than meets the eye in the transference to Farnborough, but the move is one which will bear careful watching.

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The Coupe Deutsch

As recorded elsewhere in this issue, the race for the Coupe Deutsch this year, was a most unsatisfactory affair. To all intents and purposes, there was no race, as only one competitor, Lasne, finished the course. Casale retired with radiator trouble. Lecointe crashed. Brack-Papa did not properly cross the starting line on the first attempt and abandoned the race in the second; while James was rendered *hors de combat* by his map strings. As the only British representative the failure of James was naturally a keen disappointment to all interested in British aviation, not to mention the Gloucestershire Aircraft Co. and Napiers. After taking every precaution, and spending a great deal of money on getting the Mars I and its engine into the best trim possible, to see all chances of success shattered by such an absurd happening must have been a great blow to all, and we sincerely sympathise with the firms most concerned. At the same time, the mishap was one that should not have been possible, as, even if the pilot considered this a satisfactory method of carrying the maps, those responsible for the machine might well have insisted on some less haphazard way of securing the maps.

It is not only from the British point of view, however, that the race was disappointing. As things happened, the race has taught us nothing, and we know no more than the French as to which is really the fastest machine in the world today. The speeds put up by Lasne and (unofficially) by Brack-Papa are certainly slightly in excess of those attained last year, but not one of the really fast machines had an opportunity of showing what it could do. Sadi certainly did establish a new record over the 100 km. course, but his ignition trouble prevented him from completing the whole course. It is to be hoped that next year's race may prove more successful, and we shall look forward to Britain being represented, not by one machine, but by the full three to which each country is entitled.

FLIGHT

THE BOULTON AND PAUL "BOLTON" (P. 15)

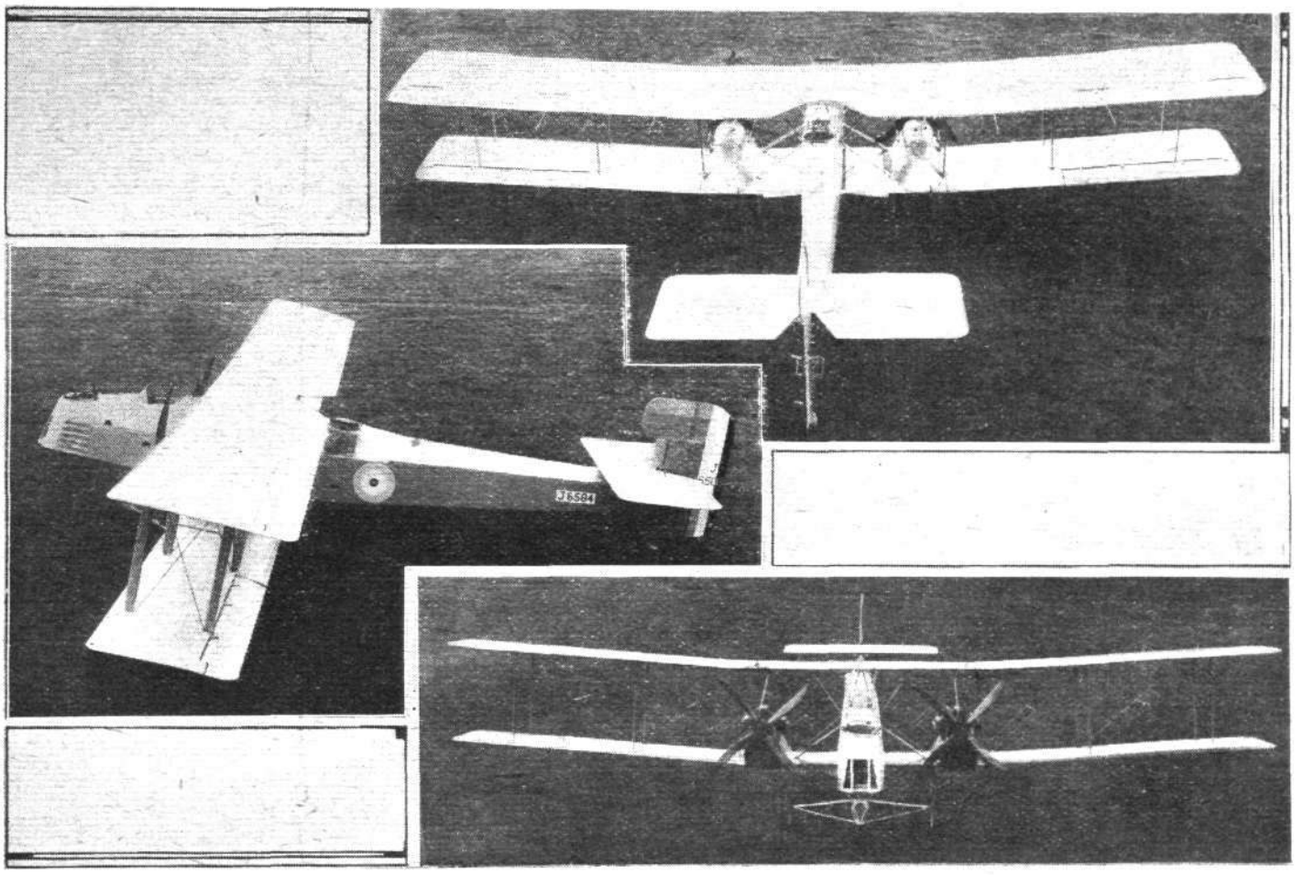
Two 450 H.P. Napier "Lion" Engines

IN our issue of September 14, 1922, we published photographs of the new Boulton and Paul "Bolton" all-metal biplane (in skeleton), with two Napier "Lion" engines. On Friday of last week we paid a visit to the Boulton and Paul works at Norwich, where we had the privilege of examining the machine and of seeing it flown by Mr. Courtney. As the "Bolton" is built for the Air Ministry, but few particulars may be published, but the accompanying photographs, showing the machine after being covered will give a very good idea of the general lines. Concerning the really interesting features of the new biplane, *i.e.* the all-metal construction, nothing may be said, and the following notes therefore deal with the general design rather than with constructional details.

Although the "Bolton" bears a certain family resemblance to the famous "Bourges," it differs from the earlier machine not only in size, but also in several other important respects. The power plant consists of two Napier "Lion" engines, mounted fairly high in *nacelles* carried on the lower plane. As the question of efficient cooling is one about which comparatively little is known, it is of interest to note that in the "Bolton" the Napier engines are left uncovered to an unusual extent, with the consequence that radiators of relatively small size can be employed. A further advantage of this arrangement is that the exhaust silencers, which are of the patented Boulton and Paul type, with aluminium manifolds terminating in steel pipes having saw-cuts in them, are very efficiently cooled. In spite of their simplicity and lightness, these silencers are certainly very effective, as we had an opportunity of ascertaining, and it appears probable that the combination of exposed engines and small radiators offers no more resistance than enclosed engines with large radiators and complicated exhaust pipe arrangements.

Another feature noted in connection with the engines was the absence of vibration. When both engines were running all-out on the ground it was not possible to detect any vibration of the lower plane, a fact for which no doubt the special design of engine mounting is responsible. While on the subject of the engines, reference may be made to the unusual starting arrangement, which is one of the neatest we have seen so far. Instead of mechanics having to climb about on the machine in order to reach and turn the starting handle, arrangements are made in the "Bolton" for starting the engines from the ground, long shafts running from the engines, inside the *nacelles*, down to the tail end of the *nacelles*, where a starting handle can be inserted and the engines turned over by a mechanic standing behind the trailing edge of the lower plane. Not only is this position very comfortable and allows of maximum effort being applied, but should the mechanic slip his foot will not go through a plane or damage some important part, as is apt to occur in machines where the mechanic has to stand on a wing or other part.

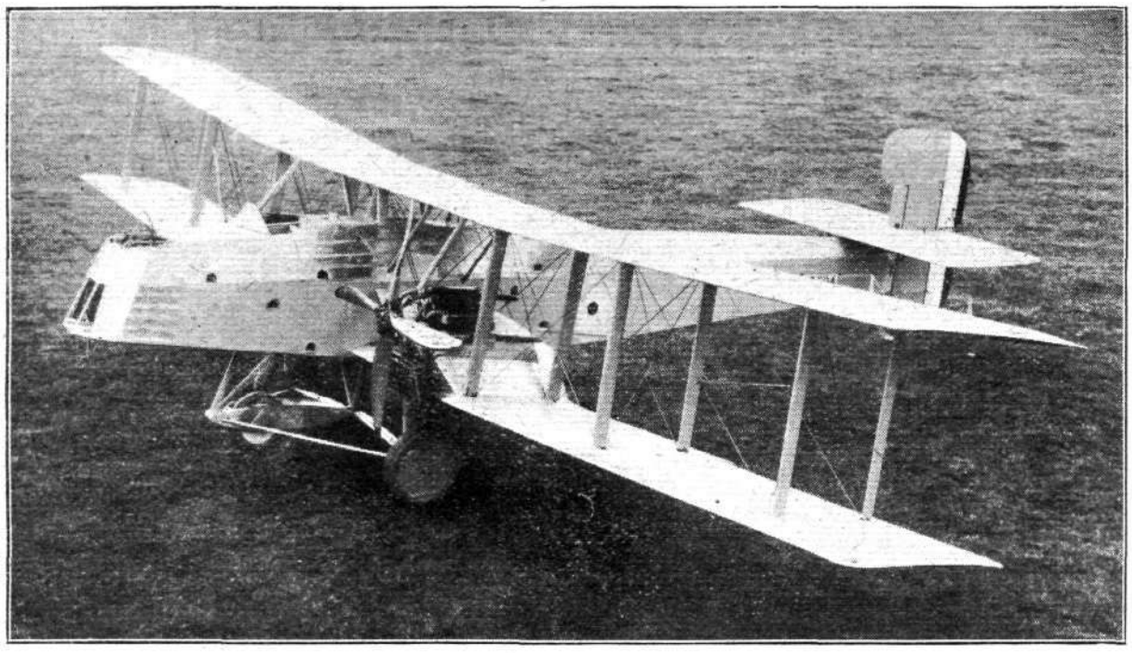
The petrol system consists of main tanks mounted in the *fuselage*, with pumps (driven by windmills) constantly delivering to a feeder tank, also mounted in the *fuselage*, but at sufficient height to give gravity feed to the carburettors. Thus there is no petrol in the engine *nacelles*, while unsightly gravity tanks, externally mounted, are avoided.



Three views from above of the Boulton and Paul "Bolton" all-metal machine, with two Napier "Lion" engines.

The wings are of usual form as regards their external appearance, but are, like the rest of the machine, built entirely of steel, with exception of the covering, which is the usual doped fabric. It would of course, be possible to make the covering of metal also, but it is thought that the extra weight which this would entail would outweigh any advantage arising out of metal covering. The *ailerons* are of the type in which the hinges are placed some distance back from the leading edge, the balance being formed by the forward third of the *aileron* and not by a horn balance projecting forward outside the wing tip.

Several interesting features are incorporated in the tail. Thus in addition to the usual trimming tail plane, a trimming fin has been employed, which works in a manner similar



The Boulton and Paul "Bolton," two 450 h.p. Napier "Lion" engines.

to the trimming tail plane, its sideways displacement having, of course, for its object to equalise any turning moment set up by one engine developing less power than the other. As soon as the pilot discovers that one engine is dropping its revolutions, he turns a wheel in the cockpit and the fin moves over until the machine has no tendency to turn. The rudder is hinged to and moves over with the trailing edge of the fin.

The undercarriage is of a special oleo type, and from observation of the machine taxying and landing it would appear that the shock-absorbing qualities are extraordinarily good, no tendency to bouncing being noticeable. In addition to the two main wheels a third and smaller wheel is placed centrally and some distance ahead of the main undercarriage. This wheel prevents the machine from nosing over in a bad landing, and is partly enclosed in a streamline casing. It is sprung by rubber shock-absorbers.

Although the "Bolton" has not yet been thoroughly tested out, the few flights which have been made indicate that, when certain alterations which are always found necessary with new types, and which have, of course, nothing whatever to do with the metal construction, have been carried out, the new Boulton and Paul P.15 will be a very fine machine indeed. It appears to take off very quickly, and although on the occasion of our visit Courtney was not attempting to make rapid climbs, the machine appeared to get away very well, requiring but a very short run. Its landings also were very good.

We regret that no reference to constructional details is permitted, otherwise an illustrated article on the "Bolton" would, we feel certain, be of more than passing interest, the metal work being an extremely pretty piece of engineering and representing very great progress and advance over anything hitherto done in this or any other country. Time alone can show how metal will stand up to vibration, dampness, etc., but, as far as can be seen at present, there is no reason to suppose that it will give any unexpected trouble. We congratulate Boulton and Paul, and Mr. J. D. North, their chief engineer, on a very fine piece of work, and express the hope that they will continue their pioneer work on all-metal construction.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN SEPTEMBER 24 AND SEPTEMBER 30, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods		h. m.		
Croydon–Paris	41	108	15	30	38	2 54	D.H. 34 G-EBBS (1h. 50m.)	B. (4), D.H. 9 (1), D.H. 34 (4), G. (10), H.P.W.8B (3), Sp. (2), Vi. (1), Vk. (1).
Paris–Croydon	44	149	10	31	40	2 58	D.H. 34 G-EBBQ (2h. 0m.)	B. (8), D.H. 9 (1), D.H. 34 (4), G. (10), H.P.W.8B (3), Sp. (2), Vi. (1).
Croydon–Brussels ...	6	29	—	—	6	2 12	D.H. 34 G-EBBV (1h. 52m.)	D.H. 9 (1), D.H. 34 (2).
Brussels–Croydon ...	9	29	—	—	9	2 52	D.H. 9 G-EBAN (2h. 3m.)	D.H. 9 (2), D.H. 34 (2), Vi. (1), Vu. (1).
Croydon–Rotterdam–Amsterdam.	6	4	6	6	6	3 7	Fokker H-NABJ (2h. 15m.)	F. (6).
Amsterdam–Rotterdam–Croydon.	7	8	6	5	7	2 45	Fokker H-NABN (1h. 53m.)	F. (6).
Total for week ...	113	327	37	72	106			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys.

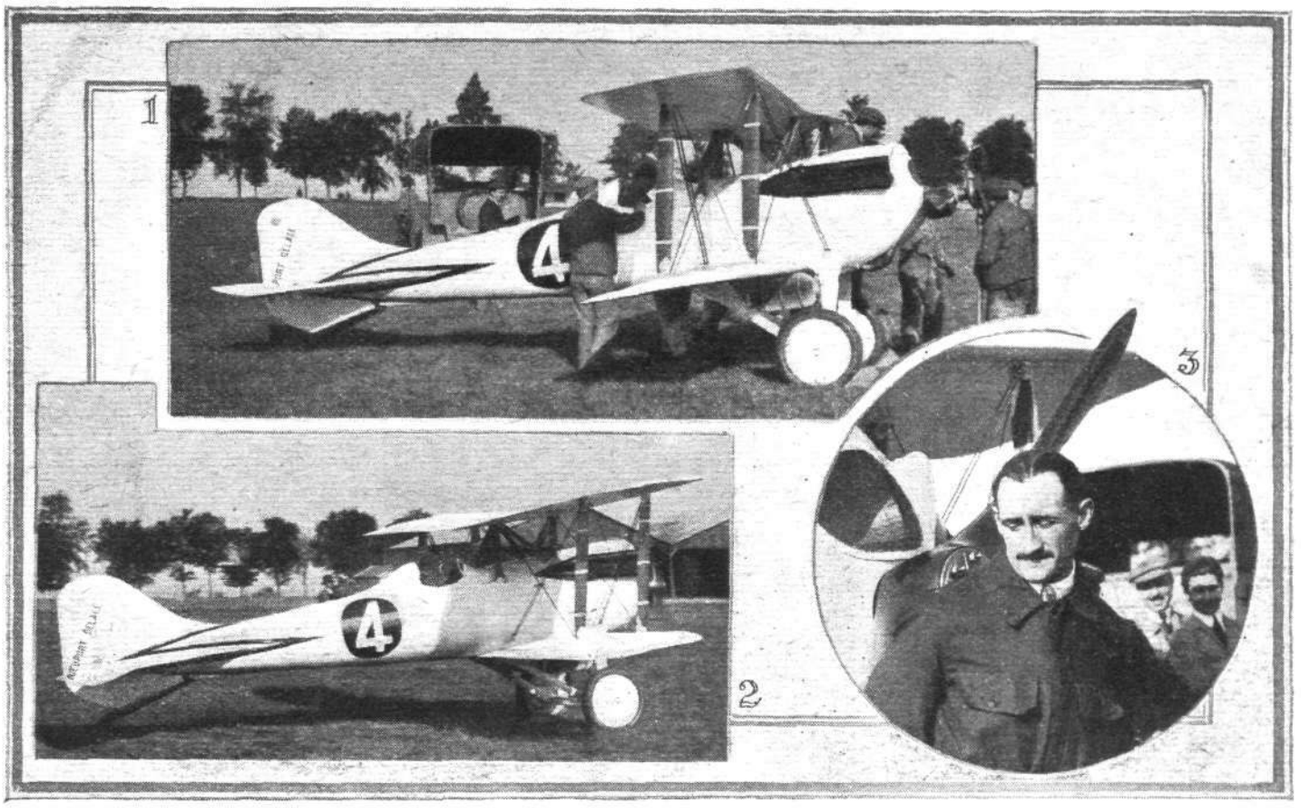
FLIGHT

THE RACE FOR THE COUPE DEUTSCH DE LA MEURTHE

France Remains the Holder of the Cup

ONCE more the race for the Cup presented by the Deutsch de la Meurthe family has been flown, and once more it has been carried off by a Nieuport pilot. Without wishing to detract in any way from the merit of the Nieuport machines, it must be admitted that but for the mishaps which befell other competitors Lasne on the (relatively) old Nieuport would not have won the race. The machine, a biplane with 320 h.p. Hispano-Suiza engine, is a very pretty little 'bus, and quite fast compared with ordinary standards, but in comparison with such machines as the "Sesquiplan" flown by Lecointe and the Mars I flown by James, the Nieuport biplane is but a medium-speed machine. This year's race was unsatisfactory in the extreme, inasmuch as it failed, for reasons to be recounted presently, to decide which is at present the fastest machine in the world. The controversy on this point will therefore continue—probably until next year's Coupe Deutsch, as speed records established in different countries, even when homologated by the F.A.I., never seem to carry the same conviction as does a speed race under equal conditions.

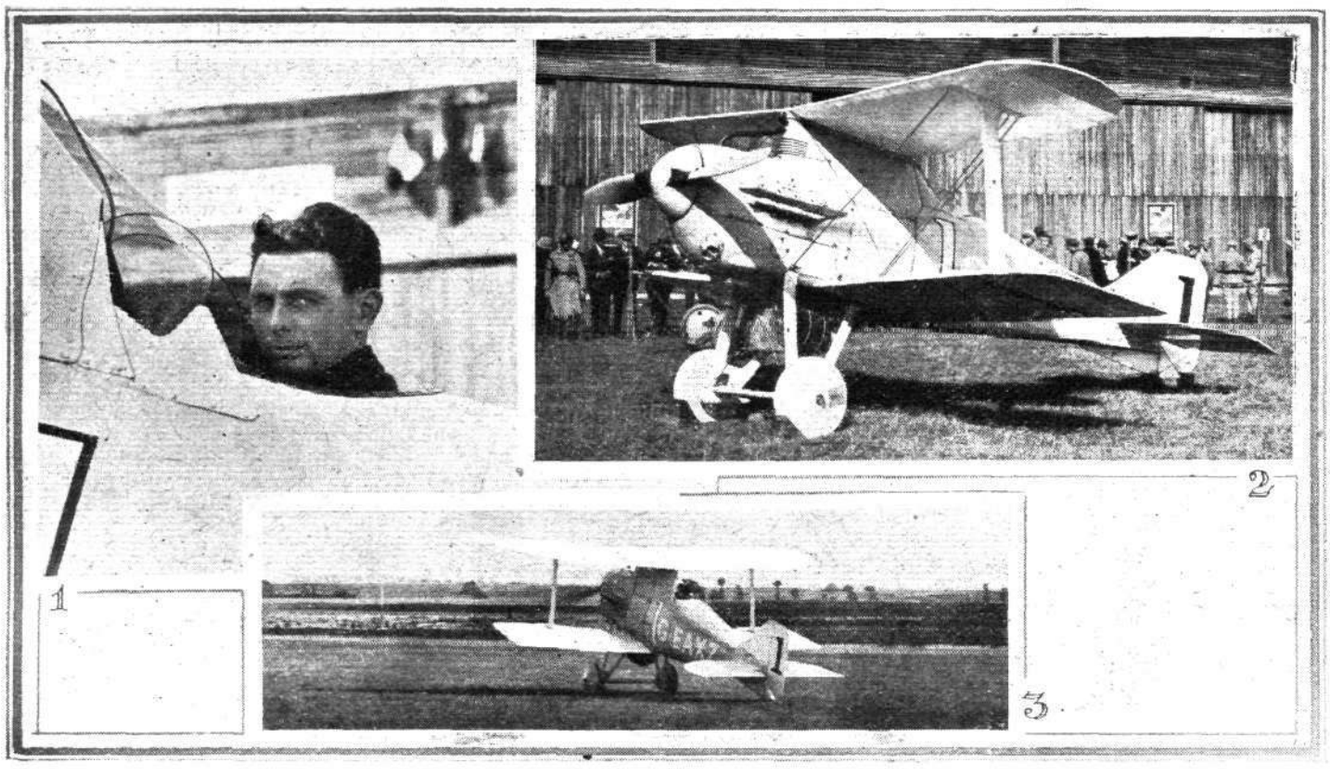
However, to return to the race itself. This year's race for the Coupe Deutsch was favoured with glorious weather. There was but little wind on the morning of September 30, and the visibility was excellent. According to the rules competitors were at liberty to start at any time after 9 a.m., and as the weather was favourable several of them did so during the morning. The first to get away was Jean Casale on the Blériot-Casale, 400 h.p. Lorraine engine. Crossing the starting line at 10 hrs. 10 mins. 48 secs., Casale disappeared in the direction of La Marmogne. His machine did not appear to be very fast, compared with some of the other "projectiles," and when he returned and rounded the pylon after his first lap his time for the 62 miles was found to be 24 mins. 21⅘ secs., or a speed of 153 m.p.h. Shortly after starting on his second lap Casale was seen to be returning, and when he landed it was found that his radiator had sprung a leak. The engine was extremely hot, and there was an unpleasant smell of burning paint. Fortunately, the machine did not catch fire in the air. In the meantime No. 2, the Italian Fiat 700 h.p. biplane piloted by Brack-Papa, had got away in good style, but it was rumoured that he had failed to cross the starting line properly, having apparently crossed behind the time-keepers instead of in front of them. However, he proceeded on his way, ignorant of any mistake, and shortly afterwards was followed by Lasne on the very pretty little Nieuport-Delage biplane, Hispano-Suiza engine. Lasne handled his machine well, and followed Brack-Papa in the direction of La Marmogne. The Italian pilot returned, swung around the pylon in a somewhat wide circle and commenced his second lap, followed shortly afterwards by Lasne, who took his corners in good style. On returning a second time Brack-Papa again took his corners wide, while Lasne kept fairly close to the pylon. At the finish both pilots made good landings, and when the times had been worked out the following announcement was made:—Brack-Papa was out of the running as he had not crossed the proper finishing line, but he would be given another start if he so desired. This he decided to do during the afternoon. In the meantime his lap times were announced to be as follows, although they did not count officially: First lap (62 miles) in 20 mins. 43⅗ secs. (179·5 m.p.h.); first two laps (124 miles) in 41 mins. 35⅘ secs. (179 m.p.h.); three laps (186 miles) in 62 mins. 27⅕ secs. (179 m.p.h.).



THE COUPE DEUTSCH: The Nieuport-Delage biplane on which Lasne (inset) won this year's race.

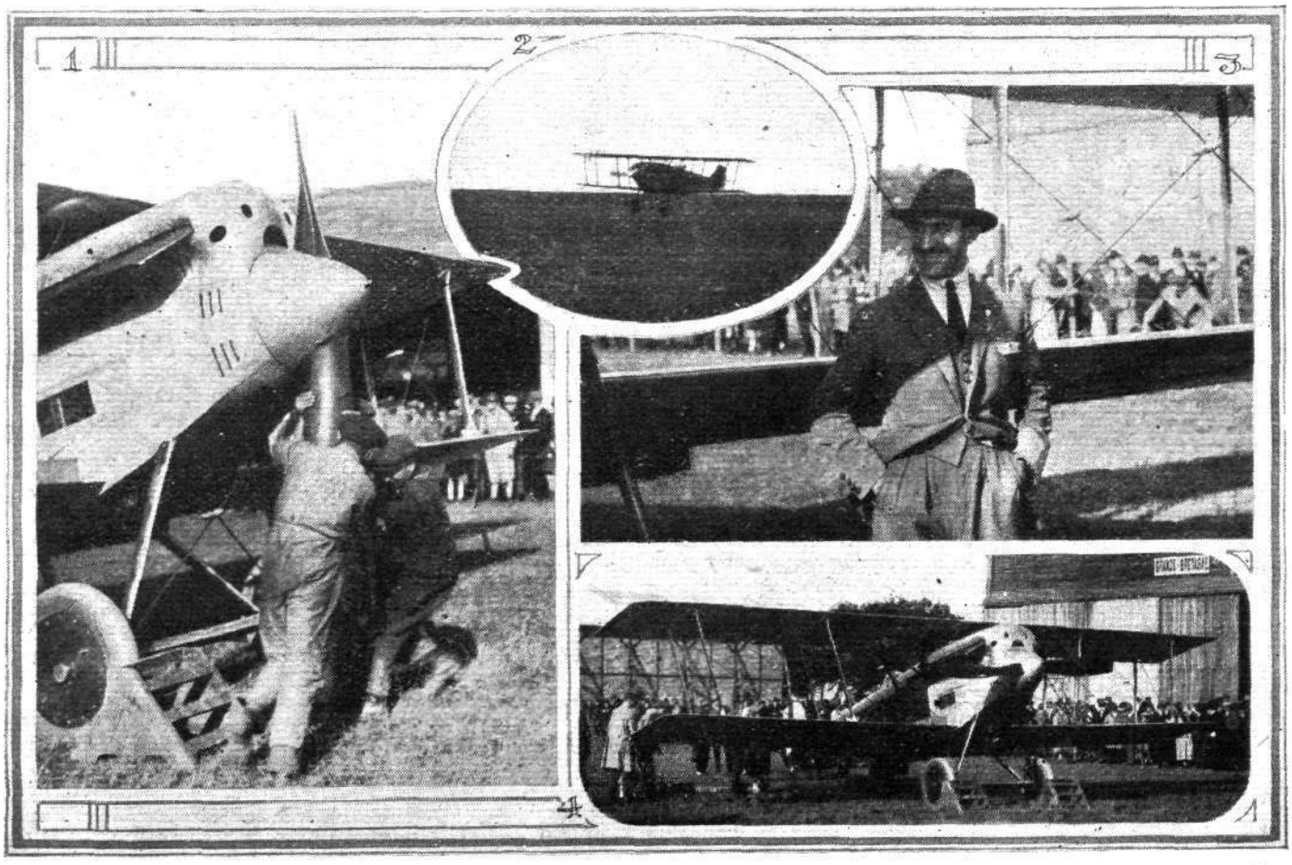
The times made by Lasne were as follows: 100 kms. (62 miles) in 20 mins. 41⅘ secs. (179·8 m.p.h.); 200 kms. (124 miles) in 41 mins. 27⅕ secs. (179·5 m.p.h.); 300 kms. (186 miles) in 62 mins. 11⅘ secs. (179·6 m.p.h.). Had Brack-Papa's times counted it would have been a very close race between him and Lasne.

After the luncheon hour, when the thousands of French visitors had finished their "pique-nique sur l'herbe," James got the Gloucestershire Aircraft Co.'s Mars I ready, and about 2.30 he took off. After cruising about for a few minutes he crossed the starting line at a terrific speed and disappeared in the general direction of La Marmogne. From the speed at which James crossed the line we began to have hopes that he might lift the Cup, but as the minutes passed without his return anxiety began to be felt. Presently he hove in sight, apparently a good deal off his course, and as he approached the aerodrome it became apparent that he was about to land.

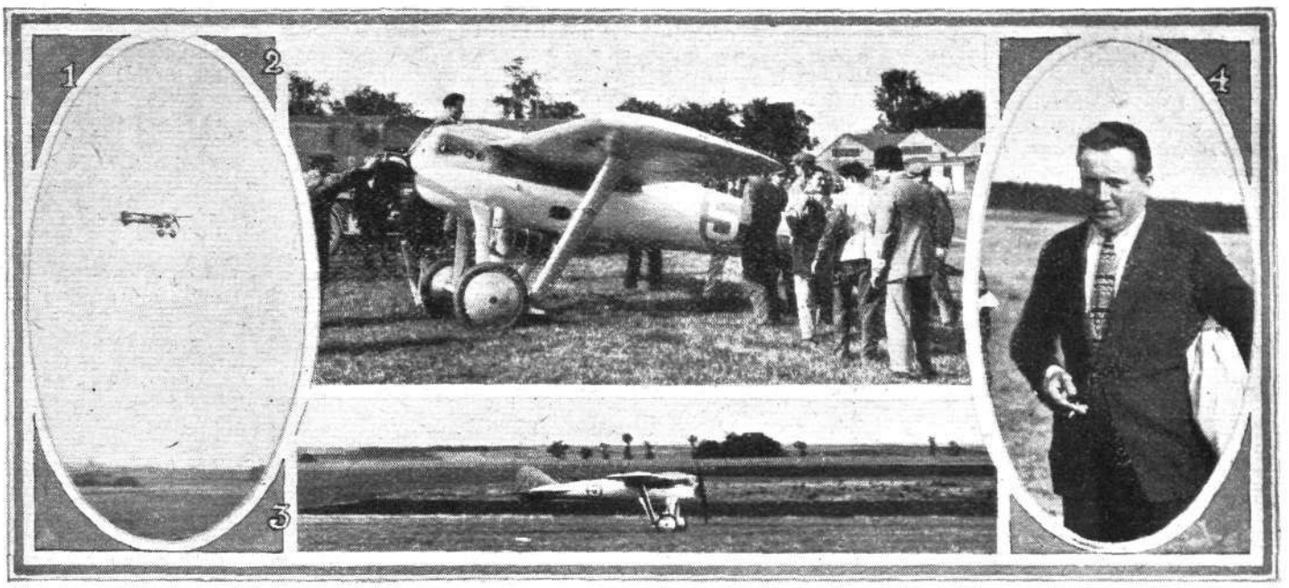


THE COUPE DEUTSCH : 1, The British representative, Mr. J. H. James. 2, The Gloucestershire Aircraft Co.'s Mars I, 450 h.p. Napier "Lion" engine. 3, James landing after his struggle with maps.

This puzzled us somewhat, as the "Lion" appeared to be roaring at the top of its voice. After making a perfect landing James told us what had happened. It appeared that he had had his maps of the course stuck on pieces of thin three-ply wood, and that the draught, getting inside the cockpit, had blown them about a good deal. While trying to keep his course and have a look at the maps the wind caught them and blew them outside, where, in a slipstream



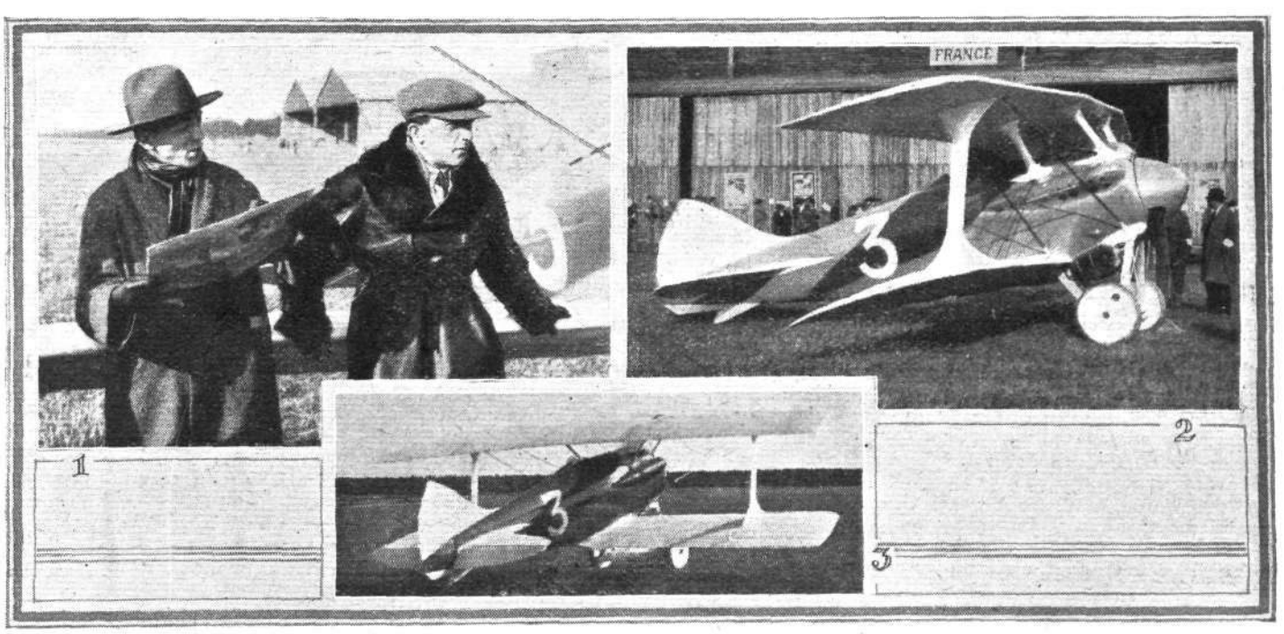
THE COUPE DEUTSCH : The Italian representative. 1, Mechanics struggling with the high-compression Fiat engine. 2, Brack-Papa landing after the race. 3, Signor Brack-Papa, the famous Italian pilot of the Fiat. 4, The 700 h.p. Fiat biplane.



THE COUPE DEUTSCH : 1, The Nieuport-Delage in the air. 2, The "Sesquiplan" flown by Lecointe. A very pretty little machine, similar to last year's, but with a different wing section. 3, Lecointe landing. A few seconds after this photograph was taken the machine turned over, fortunately without injuring the pilot. 4, M. Sadi Lecointe, the famous Nieuport pilot, who had a marvellous escape when his machine turned over on landing.

of somewhere around 220 m.p.h., they naturally flapped about furiously. The pull on the strings around James's neck became so hard that he had to break them, losing his maps. He then began to look around for La Marmogne, but during his struggles with the maps he had got considerably off his course, and when, after "cruising" about for several minutes (at about 210 m.p.h.), he failed to locate the turning-point at Gidy, he decided there was nothing for it but to return to Villesauvage. The mishap was naturally a very great disappointment to the British visitors, as there could be no doubt that James would have stood a very good chance of winning the race. As to the happy-go-lucky spirit which trusts to tying maps on with string in a machine doing over 200 m.p.h., perhaps the less said the better.

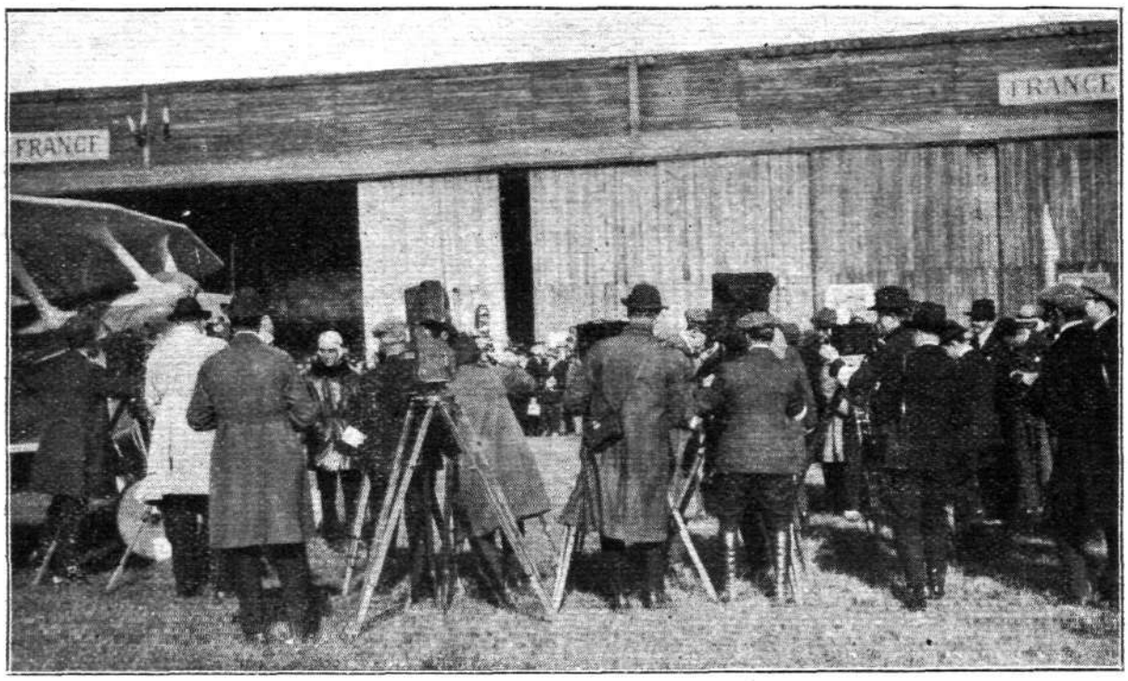
Sadi Lecointe, whose chances soared high with James's mishap, got his machine, the beautiful little Nieuport-Delage "Sesquiplan," out about a quarter to four, and after a good get-away crossed the starting line at about 3.50 p.m., going at a great pace, but certainly not giving the impression of being faster than the "Bamel." Less than 20 minutes after his start Lecointe crossed the line again, rounding the pylon in a sort of "Immelmann turn" which was nothing short of marvellous, considering the speed of the machine he was flying. We have referred several times to the absolute mastery of Lecointe in rounding a pylon, and on Saturday he did so in his best style. We doubt if there is another pilot in the world who could get the "Sesquiplan" around as quickly. After proceeding a short distance on his second outward journey Sadi was seen to be returning, and at once it was obvious that he was in trouble and was making for the aerodrome. Just before getting down it was noticed that Lecointe had stopped his engine, and as the machine touched it began to bounce about. Sadi, however, appeared to succeed in steadying it, but while it was still running along the ground at great speed it struck a rut, swerved and turned over. A groan went up from the thousands of spectators, and there were cries of "Sadi! Ah, Sadi!" In spite of the soldiers with fixed bayonets which are thought necessary to keep back a French crowd, the multitude broke from the enclosures and streamed at full speed towards the overturned machine, inside which it was expected Sadi would be lying seriously hurt. When the best runners in the crowd got to



THE COUPE DEUTSCH : The Spad representative. 1, M. André Herbemont, the famous Spad designer, and M. Jean Casale, pilot of the Spad. 2, the Blériot-Casale biplane. 3, Casale alighting with engine trouble.

the machine and lifted the tail Sadi snaked himself out of the diminutive cockpit, stood up and waved his hands, safe and sound and absolutely without a scratch. The windscreen was flattened down over the cockpit coaming, but Sadi, realising what was happening, ducked in time to get his head inside and was saved. The relief of the French visitors was shared by the British contingent, for Lecointe is a thorough sportsman, and everyone would have been sorry to see him injured. It is a very curious coincidence that just as the accident happened one visitor to the aerodrome was reading the remarks in last week's issue of FLIGHT referring to the retirement of Lecointe and the expression of the hope that he will retire before coming to grief.

Brack-Papa, who had failed to cross the starting line in the morning, was allowed to have another try, and got away about 4.35. After covering the first lap, however, he retired from the race, evidently realising that he would not be able to beat Lasne's performance. Gen. Sir Sefton Brancker, Col. Frank McClean and Commander Perrin, the Royal Aero Club representatives at the race, asked permission for James to have another attempt, but the request was refused, the reason given being, we believe, that Brack-Papa was allowed a second attempt because in the first he never crossed the starting line, and consequently officially never started, whereas James had crossed the line and could not be allowed to do so a second time. With this decision we are not inclined to quarrel. Rules are rules, and it is difficult to know where to draw the line once the rules are relaxed. With Lecointe out of the running James would, of course, have been a certain winner, his machine being far and away faster than Lasne's. His failure was naturally a keen disappointment to the Gloucestershire Aircraft Co., who have spent a great deal of money on the Mars I, and to Napiers, who had taken a lot of trouble over the engine, which was, as a matter of fact, running perfectly. We hope that while the machine is in France an opportunity will be found for testing it over a measured course, as this should help to set at rest any suspicions that may linger in the minds of French aviation enthusiasts as to the capabilities of the British machine. Lecointe's time over the 100-km. course was 18 mins. 26 secs., or an average speed of 202 m.p.h., which constitutes a world's record for 100 kms. The previous record over this distance was held by Brack-Papa with a speed of 186 m.p.h. Lasne, during the race, also established two new records, that for 200 kms. in 41 mins. 27⅘ secs. and for 300 kms. in 62 mins. 11⅘ secs. The previous figures, obtained by the Nieuport pilot Kirsch in last year's Coupe Deutsch, were 42 mins. 39⅘ secs. and 64 mins. 39⅕ secs. respectively.



A DEUTSCH CUP "TAIL-PIECE": What all the pilots had to endure at Etampes. M. Casale as the smiling victim.

CORRESPONDENCE

LIEUT.-COL. SPENSER GREY'S INTER-CITY CHAMPIONSHIP

[2061] I am very gratified to see the interest taken by your journal in my suggestion for an Inter-City Championship.

I must have expressed myself badly as regards the use to which the machines were to be put after the race is over.

My idea is that the aeroplanes or seaplanes should be offered to the Air Ministry for the period of manœuvres, for tests, or at such other times as they may require them.

The machines should preferably always be flown by the proprietary town's pilot, who would naturally only be employed if a member of the Territorial Air Force.

As regards the race itself, though the R.Ae.C. will, of course, decide the conditions, I suggest that each class should have a separate event, in which case all machines would start scratch. A prize would be given for each event, and the I.C.C. cup would be presented for the best individual performance, in the opinion of the judges.

The decision as to what type of machine any particular city or town should buy would be governed by the amount of money raised and the advice of the Air Ministry.

I sincerely trust that your readers will do all in their power to further this project, and I shall be very glad to receive suggestions or criticisms from any of them.

SPENSER GREY.

Death of German Air Chief

GEN. ERNST VON HÖPPNER, the former Chief of the German Air Service, died last week at Berlin at the age of 63. Originally a cavalry leader, and Chief of the Staff to Gen. von Below, he took over the complete control of the German Air Service in November, 1916, at the time our own Air Service had gained the upper hand. As a result the German Air Service made a remarkable recovery in 1917, not only as regards the construction, etc., of machines, but in the strategy and tactics of aerial fighting. He was responsible, also, for the organisation of the Gotha raids. His book, "Germany's War in the Air," written last March, contains much interesting information on the part played by aircraft—both Allied and German—in the Great War.

R.A.F. Club Dances

THE Committee have arranged for a series of dances to be held through the forthcoming winter on the second Wednesdays of each month.

The first Dance will take place on Wednesday, October 11, from 9.30 p.m. to 2.30 a.m., and subsequent dances, subject to sufficient support being available, will be held on November 8, December 13, January 10, 1923, February 14 and March 14.

The charge for dance tickets is 12*s.* 6*d.* for each member or guest, a price which includes a buffet supper with "cup" ices, and coffee or hot soup on leaving. If preferred, a ticket to include dinner and the dance will be available at 17*s.* 6*d.* per head.

FLIGHT

GLIDING, SOARING AND AIR-SAILING

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

SEVERAL more entries have now been received for the *Daily Mail* gliding competition at Itford Hill, Sussex, and a considerable number of machines, although not definitely entered at the moment of writing, will undoubtedly be entered before the closing date, Saturday, October 7. Commander Perrin, who has just returned from France, learned that at least four French gliders will be entered. One of these is the Farman flown by Bossoutrot in the French competition at Combegrasse, and another is the Dewoitine monoplane on which Barbot (whom the *Daily Mail* will insist on calling Barpot) flew for 20½ minutes. This machine is a cantilever monoplane with thick wing section, and is stated to be very scientifically designed. At present it is not known what the other two machines will be.

* * *

MR. H. E. WAITE, of Morecambe, Lancashire, has entered a monoplane with some form of flapping wings, having a span of 54 ft. Mr. Waite is the constructor of the machine, and will pilot it himself in the competition.

* * *

MR. C. FROBISHER, of Sheffield, has entered a monoplane of 30 ft. span, the wings of which, it is stated, will be worked by pedals. This machine has been built by the Sheffield School of Aeronautics and Engineering. The weight is given as about 100 lbs. The machine will be piloted by Mr. Frobisher.

* * *

A BIPLANE of 26 ft. span, and weighing approximately 110 lbs., has been entered by Mr. A. P. Maxfield, of Birmingham, who will pilot the machine himself.

* * *

IT seems that flapping wing machines will be much in evidence at the competition. Another ornithopter monoplane, whose wings will be operated by foot-power, has been entered by Mr. H. S. Dixon, of Ealing Common. The machine is stated to weigh but 50 lbs., although the span is 30 ft. We hope Mr. Dixon will win in the foot-power *versus* foot-pounds match.

* * *

MIJNHEER FOKKER has intimated his intention of entering his two biplane gliders for the competition. It was on one of these, it will be remembered, that Fokker made a flight of 13 minutes' duration (*hors de concours*) in the Rhôn. The machines are characterised by great simplicity, and it is stated that they took only 10 days to build.

* * *

THE de Havilland glider, a full description of which appears in this issue, has not yet been entered, but it is practically certain to be among the starters on October 16. In addition to the entries mentioned above, there is reason to believe that at least another half-dozen will be entered by Saturday, so that, given reasonably favourable weather, the competition should provide a great deal of sport, even if no sensational flights should be made.

WHICH IS THE "BEST" WING SECTION FOR A GLIDER?

Some Fundamental Considerations in Choice of an Aerofoil

FROM the number of enquiries which we have received, it appears that among those who are interested in gliders and gliding there are many who find considerable difficulty in visualising what, exactly, are the characteristics one must aim at to get the best results. In taking all factors into consideration one is, as a matter of fact, faced with almost as many conflicting problems as in the design of power-driven machines, but by leaving out some of the factors it is, at any rate, possible to fix one's ideas and to sort out some of the more important features which must be incorporated in a design if good results are to be obtained.

From enquiries received it would appear that there are two pitfalls into which the unwary are apt to fall. One is to assume that if a certain wing section has a very high value of the L/D ratio it must necessarily make a good glider, because the gliding angle is very small. The other view is that one must have a high-lift wing so as to get a low gliding speed. The actual facts are, of course, that what one should aim at is to get a wing section which will combine both *at the same angle of incidence*. This should be clear if one remembers that a high L/D, or small gliding angle, may give a very flat glide, but that if the lift coefficient corresponding to this gliding angle is small the gliding *speed* will be high, and consequently the rate of descent may also be high. Now in order to make use of winds of relatively small velocity and of small upward trend, the rate of descent should be as small as possible, and this is attained by making the gliding *angle* and the gliding *speed* small, at the same angle of incidence. Therefore, the wing section which combines the highest L/D with the highest lift coefficient will give the lowest rate of descent.

It may not be without interest to examine, briefly, the considerations which lead to this conclusion, and to establish the very simple ratios which give the best results. In doing this we shall attempt to be as clear as possible without going into "mathematics" other than the most simple. The only thing which we take for granted is a slight knowledge of the fundamental principles of trigonometry and algebra.

The gliding angle ϵ is, of course, given by the well-known trigonometric ratio $\tan \epsilon = \frac{D}{L}$, where D is the drag and L the lift of the wing. Expressed in terms of the drag and lift coefficients, k_D and k_L respectively, the gliding angle is $\tan \epsilon = \frac{k_D}{k_L}$. The rate of descent, which we will call V_v (*i.e.*, vertical velocity), is given by $V_v = V \sin \epsilon$, where V is the air speed of the machine. For small angles, such as would come within the range of gliding angles of a glider, the sine and the tangent of the angle are sufficiently nearly equal to allow of substituting $\tan \epsilon$ for $\sin \epsilon$, and we can, therefore, write $V_v = V \tan \epsilon$ instead of writing $V_v = V \sin \epsilon$. In order to find the gliding speed V we make use of the well-known fundamental formula $W = k_L \rho A V^2$, where W is the weight of the machine in lbs., k_L is the lift coefficient of the wing section used (in "absolute" units) ρ is the density of the air, A is the wing area in square feet and V the velocity, either in m.p.h. or in ft./sec. When V is in m.p.h. the value of ρ in the equation is 0·0051. When V is in ft./sec. the value of ρ is 0·00237.

Now it will be seen that this fundamental formula can be written $V = \sqrt{\frac{W}{k_L \times \rho \times A}}$, from which V can be found at any loading and lift coefficient. We have already established the formula $V_v = V \tan \epsilon$, and have seen that $\tan \epsilon = \frac{k_D}{k_L}$. If we substitute these two values we get $V_v = \sqrt{\frac{W}{k_L \times \rho \times A}} \times \frac{k_D}{k_L}$, or $V_v = \sqrt{\frac{W}{\rho \times A}} \times \frac{k_D}{k_L^{3/2}}$

The quantity under the square-root sign is the wing loading. Consequently the rate of descent is smallest (for that wing loading) when the ratio $\frac{k_L^3}{k_D^2}$ is a maximum. This ratio can, of course, be written as $\left(\frac{k_L}{k_D}\right)^2 \times k_L$, or as $(L/D)^2 \times k_L$. In order, therefore, to determine which wing section gives the lowest rate of descent for a given wing loading we must find the one which gives the highest value of the ratio $(L/D)^2 \times k_L$.

An examination of the characteristics of a very great number of gliders reveals the fact that the great majority have a wing loading of approximately 2 lbs./sq. ft. If, therefore, this figure is assumed as a fair average, we can compile tables of gliding angles, gliding speeds, rates of descent, etc., for a number of different wing sections. This wing loading has been assumed in the following tables, in which the first column gives the angle of incidence; the second gives the L/D ratio at that angle of incidence, and the third the corresponding lift coefficient in "absolute" units. In the fourth column are tabulated the squares of the L/D ratios, and in the fifth the square of the L/D ratio multiplied by the lift coefficient. The sixth column contains the velocity corresponding to the different lift coefficients (obtained from the equation $V = \sqrt{\frac{W}{k_L \times \rho \times A}}$). Finally, the last column contains the value of the rate of descent

corresponding to the various gliding angles and gliding speeds, for the assumed wing loading of 2 lbs./sq. ft.

Owing to its popularity for power-driven aircraft and its good efficiency the section known as RAF 15 might be expected to be suitable for a glider. It is observed, however, that the lift coefficients corresponding to the high values of L/D are small, and possibly the rate of descent will therefore be fairly high. The first section whose data are tabulated is the RAF 15, and it will be seen that the highest value of $(L/D)^2 \times k_L$ is 75·7 and that this value occurs at an angle and lift coefficient which correspond to a speed of 36·4 m.p.h. when the wing loading is 2 lbs./sq. ft. The rate of descent is 3·32 ft./sec. For this wing loading the RAF 15 section gives a landing speed of 27·6 m.p.h.

It was mentioned at the beginning of these notes that the lowest rate of descent would not necessarily be obtained at the angle giving the flattest glide, and it will be seen that for RAF 15 this statement is borne out. The maximum L/D of this section occurs at 4°, but the corresponding gliding speed is 41·6 m.p.h., which gives a rate of descent of 3·58 ft./sec.

For the section Göttingen No. 441 the lowest rate of descent is 3·38 ft./sec., but this corresponds to a speed of 30·6 m.p.h., and the landing speed is lower, being 22·1 m.p.h. Particulars of Göttingen No. 441 section were published in our issue of September 21. It has, we believe, been extensively used on German gliders, and it will therefore be of interest to examine several British sections so as to discover whether or not an even better section can be found.

The section known as airscrew No. 3, the data for which were published in Reports and Memoranda No. 322, shows extraordinarily high values of $(L/D)^2 \times k_L$, the best being 118 as compared with the 75·7 of RAF 15 and 74·4 of the Göttingen 441. The lowest rate of descent is 2·68 ft./sec., and the rate does not change greatly over a range of from 2° to 8° incidence. This section is somewhat thin, and would require a braced wing structure. As a braced monoplane, however, airscrew No. 3 should be very suitable.

Airscrew No. 4 gives a very slightly higher rate of descent, and its L/D (or gliding angle) is not quite so good. It is, however, a much thicker section (maximum thickness 0·127 of the chord), and could be used on a cantilever monoplane. It gives a landing speed of but 21·5 m.p.h.

Airscrew No. 5 gives a slightly higher rate of descent, and its best gliding angle is 1 in 14·7. It is, however, a very thick section, and might be used in the centre of a large-span wing, end sections of a thinner section being attached to it.

The foregoing remarks should help to give those who have not previously given the subject much thought a general idea of the things to be aimed at in choosing a section for a glider. It will readily be understood that other considerations than aerodynamic ones have to be considered. Thus a thin wing will be heavier per unit of area than a thick wing for the same strength, and this has to be taken into account in deciding the respective merits.

As to the actual piloting of a glider, a few general remarks may not be without interest. If our glider is fitted with airscrew No. 4 section, and we wish to remain in the air as long as possible, we would obviously fly the machine at the speed corresponding to the lowest rate of descent, *i.e.*, at 32 m.p.h. Even in a gusty wind the pilot would try to keep the machine at this speed; that is to say, in a gust he would elevate and in a lull he would push the stick forward. Gliding is largely a matter of flying at a constant speed, and in this connection it is of interest to note that Smith and Sons have already introduced an air-speed indicator which reads from 10 m.p.h. upwards, and is therefore specially suitable for gliders.

If a pilot wished to cover the longest possible distance, he would fly at the angle giving the flattest glide, *i.e.*, at maximum L/D. This applies to flying in still air. In a wind the pilot would attempt to gain height while gliding into the wind, and when he felt himself getting outside the region of ascending air currents he would turn down wind and glide for as long a distance as possible.

R.A.F. 15

Angle of Incidence. (Degs.)	L/D.	k_L. (Absolute.)	$(L/D)^2$	$(L/D)^2 \times k_L$.	V. (m.p.h.)	V_v. ft./s.
4	17·1	·226	292	66·0	41·6	3·58
5	16·7	·260	279	72·5	38·9	3·42
6	*16·1*	*·296*	*259*	*75·7*	*36·4*	*3·32*
8	14·3	·369	202	74·5	32·6	3·36
			Landing speed ..		27·6	

Göttingen No. 441

—2	15·2	·275	231	63·5	37·7	3·65
0	14·6	·34	213	72·5	34·0	3·42
2	*13·3*	*·42*	*177*	*74·4*	*30·6*	*3·38*
4	12·2	·48	149	71·6	28·6	3·44
			Landing speed ..		22·1	

Airscrew No. 3

2	19·7	·274	388	106·4	37·8	2·82
3	*19·4*	*·313*	*376*	*118·0*	*35·4*	*2·68*
4	18·3	·351	335	118·0	33·4	2·68
6	16·5	·425	272	116·0	30·3	2·70
8	14·8	·490	219	107·4	28·3	2·81
			Landing speed ..		25·3	

Airscrew No. 4

2	17·5	·308	306	94·5	35·7	3·0
3	17·5	·345	306	106·0	33·5	2·83
4	*17·1*	*·384*	*292*	*112·0*	*32·0*	*2·75*
6	15·5	·453	240	109·0	29·4	2·79
			Landing speed ..		21·5	

Airscrew No. 5

2	14·7	·391	216	84·5	31·7	3·17
4	*14·0*	*·462*	*196*	*90·5*	*29·1*	*3·06*
6	13·0	·536	169	90·6	27·1	3·05
8	12·0	·599	144	86·3	25·6	3·14
			Landing speed ..		22·2	

THE NEW DE HAVILLAND GLIDER

Parasol Monoplane with Wire Bracing

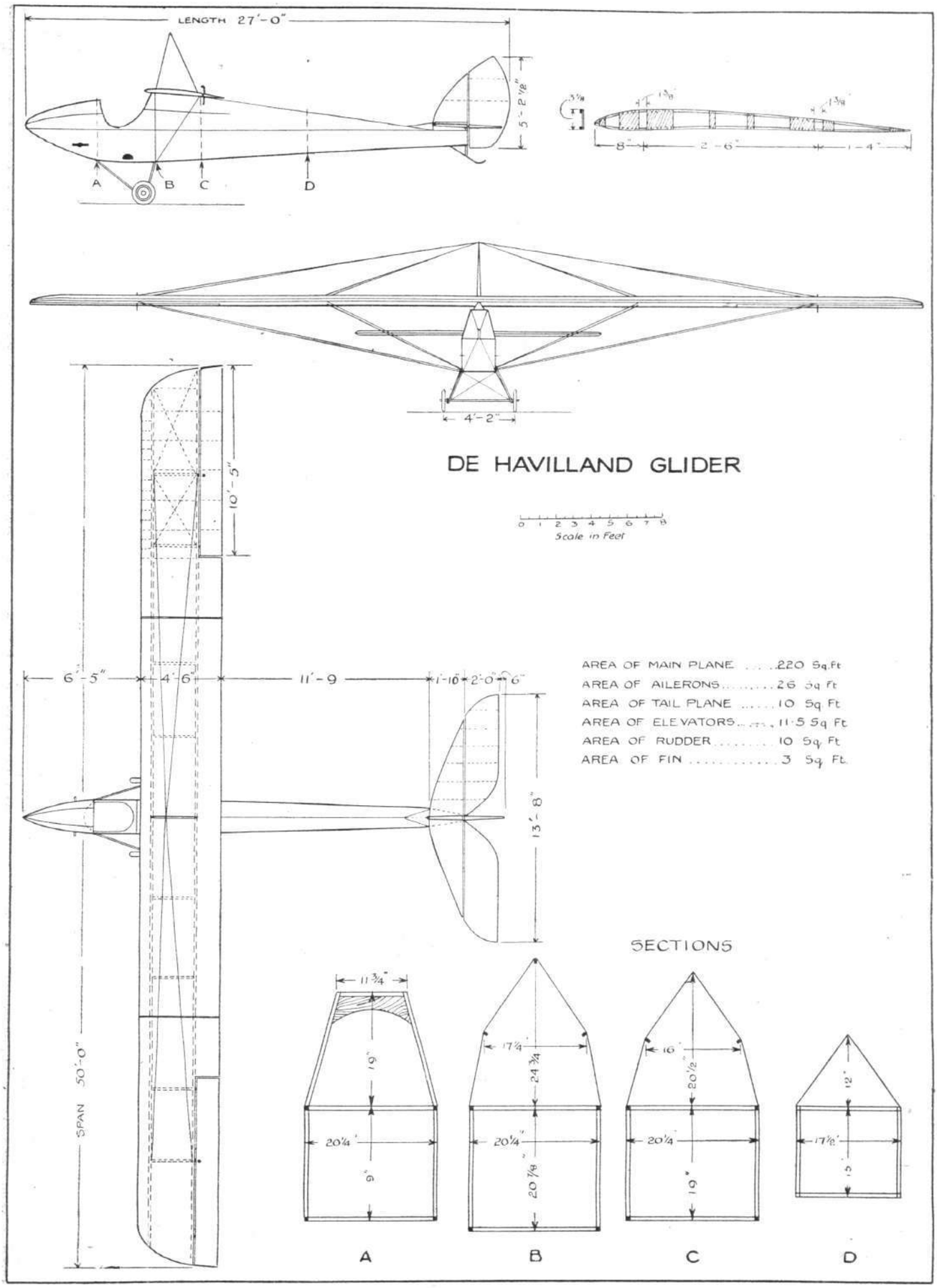
THE first of the two monoplane gliders which are being constructed at the Stag Lane works of the de Havilland Aircraft Co. will be finished this week, and it is hoped that some preliminary test flights may be made during the next week or so. On Monday we paid a visit to the D.H. works, and the glider was then erected and the bracing wires of the wings were being rigged and finishing touches given to various minor parts. At present the machine is fitted with a vee under-carriage, but probably later on, when the pilot has got used to the machine, a modified form, fitted inside the fuselage, will replace the present tubular vees so as to save resistance.

From the accompanying scale drawings it will be seen that the de Havilland glider is characterised by a parasol monoplane wing of very high aspect ratio (11 to 1), and that in spite of the fact that the wing has external wire bracing the appearance is very clean. The wing section used is R.A.F. 15, but a slight departure from the standard section has been made by stepping down slightly the ordinates of the top surface. This has been done in order to reduce spar weight, as it was found that with the spar section employed (I-section) the standard section would give rather too heavy spars. Both front and rear spars are of spruce, and the ribs are built up of spruce flanges, approximately ¼ in. square, the form of which is preserved by webs or distance pieces tacked to one side of the spruce flanges, as shown in one of our sketches.

The internal bracing is in the form of small-gauge piano wire, and the use of wire strainers has been avoided by using U-bolts passing horizontally through the spars. The system of bracing is, however, different from that employed in the old Blériots, inasmuch as alternate bays have the drag wires anchored to ordinary wiring plates. Thus the trueing-up is not quite the work of art it used to be in the Blériots of old.

The monoplane wing is very simply mounted on the fuselage by two eye bolts engaging with corresponding forked end bolts at the apices of two formers or bulkheads rising up from the top longerons of the fuselage proper. The wing thus rests on the fuselage at two points only, and these on the centre line. The bracing is therefore relied upon to maintain the wing in its proper transverse position relatively to the fuselage.

As far as the stresses in the wing are concerned, the spars may be regarded as continuous beams, as the two end sections are not pin-jointed to the large-span centre section.



THE DE HAVILLAND GLIDER: Plan, side and front elevations, to scale.

Incidentally it may be mentioned that these joints in the spars occur at the point of contraflexure (*i.e.*, where the bending moment is zero), so that no great strength is required in the joint.

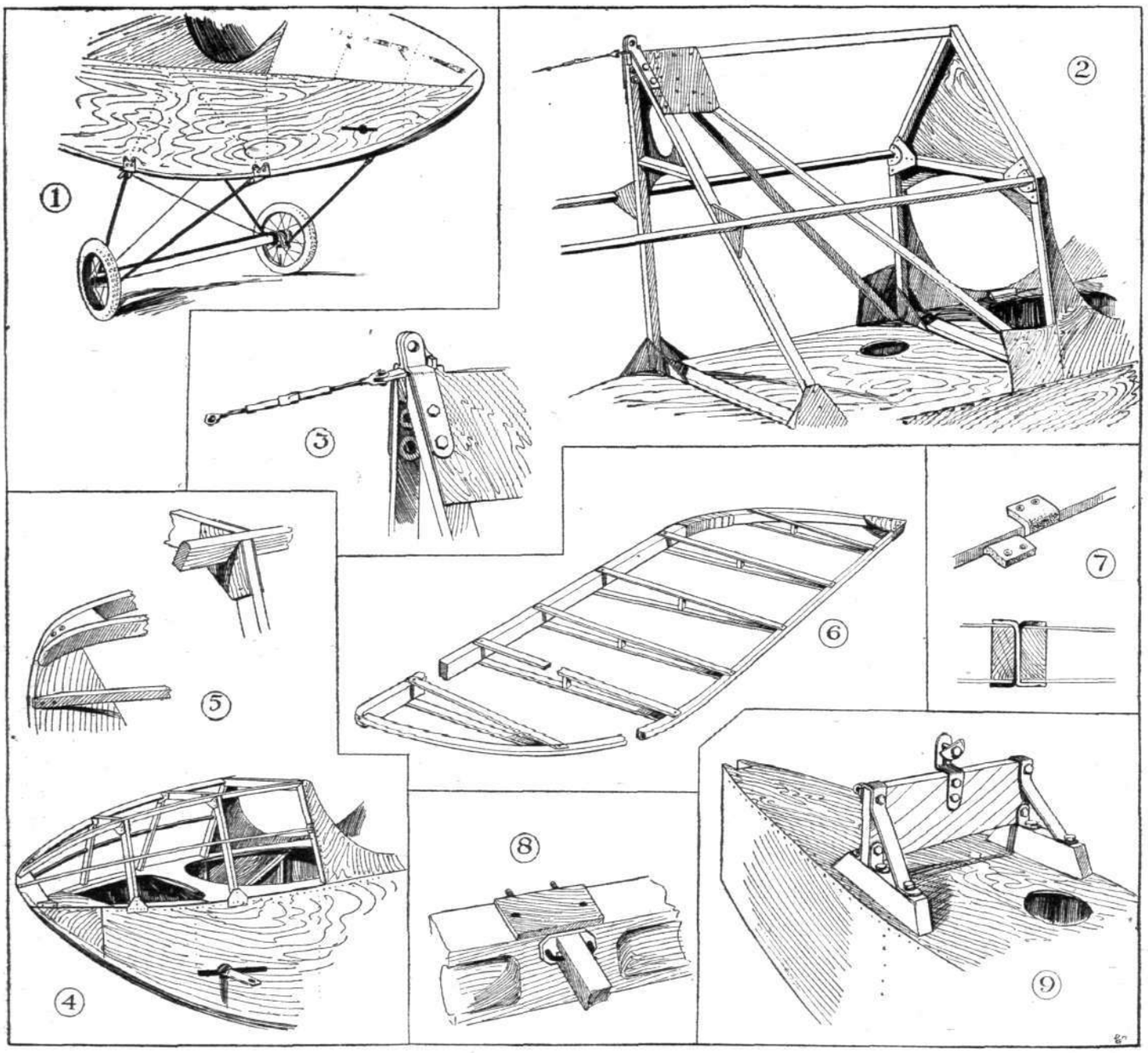
The wing bracing is in the form of solid piano wire, all lift wires being duplicated, while the top wires are all single. The spars are braced at two points between the centre attachment and the tips, so that in spite of the large span the lengths of beam between supports are not great. The lift wires are attached to the under-carriage fitting on the lower longeron of the fuselage, and on the same fitting is a lug, projecting downwards and slightly to the rear, which is to serve as an attachment for the starting rope.

The covering of the wing is white cambric, doped with the new Cellon glider dope.

The anti-lift wires are attached to a fin or pylon mounted above the wing. Lateral control is by ailerons, and in connection with these it may be mentioned that the "differential" type, patented by the de Havilland Company, is used. With this arrangement the aileron which moves up travels through a greater angle than that moved through by the opposite aileron in travelling down. Experience with power-driven machines has proved this type of aileron control to be very efficient, and as ample control is a great advantage in a glider it has been used in preference to the ordinary type.

The fuselage, as regards its main portion, consists of four thin spruce longerons, joined by struts and covered with thin (1 mm.) three-ply wood. The struts run diagonally over the greater portion of the fuselage, but here and there, where local considerations demand it, the diagonal struts are reinforced by light bulkheads. It might be pointed out that these struts are merely butted on the longerons and not attached to them except *via* the ply-wood covering, the struts being intended to serve as stiffening pieces for the ply-wood rather than as bracing members, the ply-wood performing the function of bracing.

The fuselage proper is very shallow, and in order to bring it up to the wing an auxiliary structure, consisting of light formers, has been built on to its top. It might be objected that a lighter structure would have resulted from making the fuselage structure itself the required depth, but although



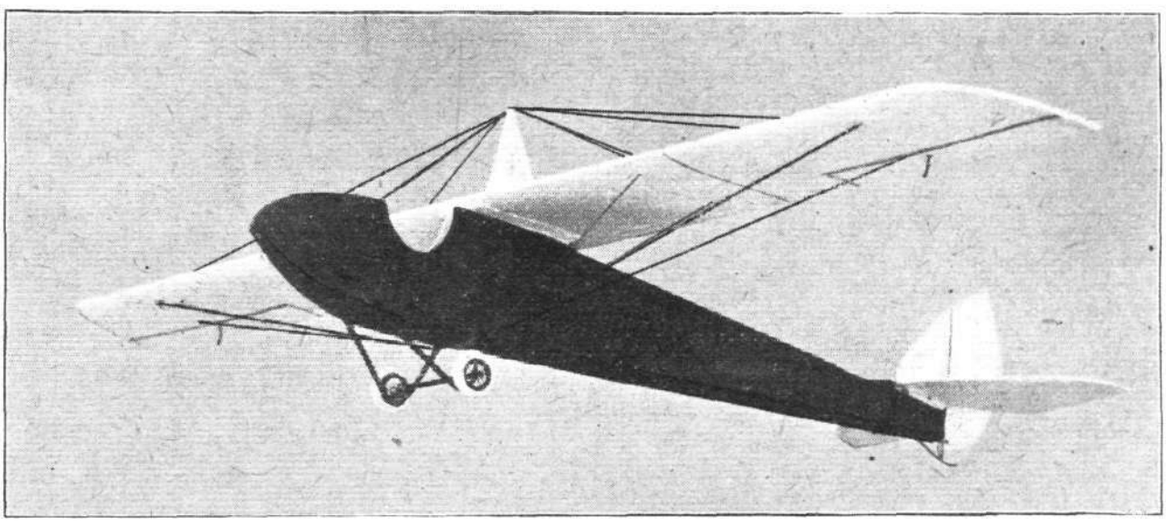
SOME CONSTRUCTIONAL DETAILS OF THE DE HAVILLAND GLIDER: 1. Front portion of the fuselage and the Vee undercarriage. 2. The bulkheads or formers to the apices of which the wing is attached. 3. Details of the top of the rear bulkhead, showing attachment of the wire which forms the ridge of the triangular top of the fuselage. 4 shows construction of superstructure over pilot's cockpit, and 5 some of the smaller details. In 6 is shown one complete elevator flap, with trailing edge cut through to show laminated construction. The leather elevator hinges are indicated in 7, and in 8 is seen the U-bolts and compression struts of the internal wing bracing. 9 shows the bulkhead on which the front edge of the tail plane is mounted.

in theory this would appear to be so, it was found in practice that to effect the necessary reduction in weight the longerons and ply-wood would have to be of such small dimensions that they would become impracticable. Consequently a shallow box was chosen for the stress-resisting part, and the rest was built on in the lightest form possible. The ridge along the top of the fuselage is formed by a wire running from the rear wing bulkhead to the tail plane, and fabric covering is put over the triangular section top thus formed.

The tail plane, elevators, fin and rudder are of very light construction indeed, and are covered, like the wings, with cambric. The elevator hinges are in the form of leather straps, similar to those used on draught screens, clothes-horses, etc., and provide quite the most light and efficient form of hinge possible. The angle through which the elevators can be moved is very great (*i.e.*, 90° each way), and the gap left between tail plane and elevator spars is always kept closed. The tail plane is mounted on a small transverse bulkhead reaching some 5 ins. above the flat top of the fuselage proper, and is secured to it by two eye bolts. The rear spar of the tail plane is bolted to the fin post. Incidentally it may be pointed out that the curved leading edge of the tail plane is formed by several laminations of spruce, which form of construction is very strong and has the advantage that curved members can be formed without steaming.

The controls are of usual type, both the foot bar and the "joy-stick" being made from steel tube. The control cables pass to the tail on the outside of the fuselage, while those to the ailerons run up along the bulkhead behind the pilot, around pulleys, through the front portion of the wing and to the control cranks inside the wing. The pilot's cockpit is just in front of the leading edge of the wing, and here, as in the aft portion, the required depth of fuselage is provided by a light super-structure. The absence of "gadgets" in the cockpit makes one wish a similar simplicity were attainable in power-driven aircraft, where the pilot usually is so surrounded by instruments that one often wonders how he ever gets any time for piloting. The only instrument fitted at present is an air-speed indicator. This is one of the new instruments just put on the market by Smith and Sons, and is designed to give readings from 10 m.p.h. upwards. Also the "lag" has been reduced to a minimum, so that the instrument should be a valuable asset on a glider which has to be flown at practically a constant speed.

As already mentioned, the de Havilland glider is at present provided with a Vee under-carriage, but later a modified type, partly housed in the bottom of the fuselage, may be fitted. The present one has Vees of steel tube, with small scooter wheels carried on an axle slung on rubber cords from the bottom of the Vees. A tail skid built up of several laminations of wood is mounted on the downward extension of the fin post, and is anchored at its free end to a leather strap screwed to the lower longerons.



THE DE HAVILLAND GLIDER : Photograph taken from below of a scale model of the machine.

At the time of our visit to the de Havilland works the glider had not yet been weighed, but it was expected that the weight empty would be in the neighbourhood of 250 lbs., in which case the loaded weight will be approximately 400 lbs., or a wing loading of under 2 lbs./sq. ft.

The machine is finished in black and white, the wings and tail being left the original colour of the fabric, while the fuselage and under-carriage are black. At the moment the glider has not been entered for the *Daily Mail* competition, but we hope it will be entered before the closing date, October 7.

AIR TRANSPORT*

IN his opening remarks Gen. Brancker briefly referred to the past history of air transport in England, and how, after the slump in 1920-21, when the Government came to the rescue with subsidies, the London-Continental air traffic developed to its present position, in which a new system has been organised whereby the three operating companies each run a separate service—to Paris, to Cologne and to Berlin. The superiority of the British pilot was, he said, the only thing of importance that stands out during that period. He next touched upon the advance made in the design of machines, from the converted D.H.9 of 1919, carrying pilot and 600-lb. load with 400 h.p., to the machines now in use, carrying eight or nine passengers with 400 h.p.

Referring to the utility of air transport, he stated that there are two distinct usages of air transport : first, it provides a military reserve, and secondly, it is a means of quickening communications. "There have been rash statements," he said, "about the military value of air transport. To judge from some of the statements made during the last year, you would think that if the Government gave me unlimited means I should next year produce a huge reserve for the Royal Air Force. That is wrong.

"From a military point of view there are three classes of British air transport to be considered. First are the air lines running within the British Isles, and these do not exist at present. The second is the cross-Channel and lines operating on the Continent of Europe; that we are just starting in the three services I have already mentioned. The third class is a form of imperial lines connecting up the Empire, which is most important.

"The first category is much the best from a military point of view. All your engines, spares, pilots and all that is necessary for an air service, if they are running within the British Isles, are available at five minutes' notice and ready from a military point of view. Against that they are the most difficult to run from an economic point of view; for this country is small, has a bad climate for flying and is well supplied with railways."

* Abstract from a lecture delivered by Maj.-Gen. Sir William Brancker, K.C.B., Director of Civil Aviation, before the Over-Seas League, October 2, 1922, Admiral Mark Kerr taking the Chair.

The second category, he said, was also good from a military point of view, as in an emergency we could get the pilots and machines back from any part of Europe in 24 hours' notice. Imperial communications would not help us at all, as the material is not immediately available, but they provide reserves wherever they are.

Gen. Brancker pointed out that ground organisation was the most important factor, requiring a lot of money to provide, but once this is done the aeroplane will achieve much. When we get the big lines across Europe and the world, then by degrees we will build up a national reserve. Air transport, before it can forge ahead, however, must pay its own way, which today it cannot, and so long as it has to be assisted it cannot extend as it ought to.

The various items which air transport will provide—pilots and mechanics, aerodromes with ground staff, design offices and factories—will be available in time of war, in addition to the machines, as night bombers or troop carriers.

"Next year," he proceeded, "we shall start a certain number of civilian flying schools for the training of reserve officers. The Royal Air Force will pay for these, and I hope we shall keep five or six schools going. They, in turn, will be able to train others at comparatively reasonable rates. This will give us a body of pilots growing up, which is something we have not got today."

Referring to the quickening of communications, he pointed out that on the London-Paris service we are only saving a few hours, but it is in long distances that a great saving of time will be effected.

Referring to linking up England and India by air, he said he did not think anyone has realised the importance of a daily post to India occupying five or six days, which is possible with 30 aeroplanes, a certain number of aerodromes *en route*, and financial assistance at the start. We have a certain number of these long-distance routes at present—Cairo-Baghdad, Toulouse-Casablanca (saving many days), and Königsberg-Moscow (in two days and one night against the present 7 to 14 days).

Airships, he stated, we must always consider in our transport. They are more expensive to build, fly more slowly, and are susceptible to bad weather, but they have the advantage that they can fly by night. Airships will probably take mails to India in 72 hours, against six days by aeroplane. When aeroplanes fly by night we will get an increased speed. The aeroplane and the airship, however, are not rivals. The aeroplane is a close range machine of, say, 500 miles, but an airship will do two or three thousand miles. Therefore, in the future, through—mails to India and Australia, and from India to Egypt, may go by airship, and to all the other places around the mails will be carried by aeroplanes, and airships and aeroplanes will thus work together.

"Safety is abolutely necessary, and can be obtained. Until the public really believe in the safety of aviation, you won't get a sufficient body of traffic to make it an economical means of transport. Air transport, however, is safe today if properly looked after. You have to be careful with your pilots, look after the maintenance of the aeroplane, have well organised routes, careful weather reporting with proper wireless equipment and good management. Given all these things, I firmly believe air transport is as safe as any other form of transport."

He next dealt with reliability—*i.e.*, running to time. One of the difficulties in the past has been casual management. Until we get air transport running to time the public won't believe in it. We are slowly bringing this about on the British Air Services.

During August we had 95 per cent. of efficiency—that is, we got through within four hours between London and Paris and London and Brussels, 371 flights, all but ten being completed in the four hours. Of involuntary stoppages during July and August about one-third were due to bad weather, which can be got over by increased safety and improved wireless reporting. Seventeen were due to shortage of petrol, which is also a matter that can be overcome. About one-tenth were due to faults in the oil system, another difficulty which is not insurmountable; and about one-quarter were due to engine trouble—little things which meant coming down and putting them right. In all these there was only one case where an aeroplane was forced to come down, only one which gave any danger, and in that one no one was hurt.

On the question of design, Gen. Brancker said we are getting aircraft more and more stable, and soon we shall have machines which will look after themselves, leaving the pilot free to look after his engine and steer. As regards comfort, he maintained that air transport is more comfortable and convenient than any other kind. Air-sickness he did not think was so unpleasant as sea-sickness, and it is more scarce. Experiments are being made to improve the cabins and introduce silencers, which will get rid of the noise of the engines.

Safety, reliability and comfort all have to be obtained before the public will travel by air as they now travel by train, but unfortunately all three factors militate against economy. That is why we must get the Government to help. Once these three factors are established, people will take up air transport with a rush, and, with a large number of people travelling, prices can be dropped—and then the subsidy can be dropped.

The maintenance of the machine, he pointed out, was one of the great costs of aircraft. The engine wears out quicker than the aeroplane, and that is one of the economical lines in which we have to make progress—to improve our engines. He thought the next few years would see considerable progress made in this respect.

A great factor to assist the using of the short routes to Paris, Brussels and Cologne, etc., will be when we take to night flying, when we shall beat the trains and at once get bigger traffic by air. Night flying is not so difficult as is made out.

The general policy is to extend these cross-Channel routes without spending more money: Paris to Lyons, etc., Berlin to Russia, and eventually to Constantinople, but only when the traffic justifies it. A few months ago an Advisory Board on Civil Aviation was created, and they have started to investigate the possibilities of these Imperial routes, and have submitted a report on the London to India route, and have prepared a route from India to Australia. They have provided for the spending of £100,000 on the Indian route and a certain amount of money on research work to develop machines for hot, damp climate—probably metal machines.

From Baghdad to India it is perfectly plain, and from Baghdad we have three alternative routes. One *via* Constantinople, which we cannot use at present; another *via* Angora, which is difficult; and the third to Alexandretta, which is probably the one that eventually will come, and he hoped to see a British line to Alexandria and to India, and an international line along the south of Asia Minor, across the Islands to Brindisi and thence to London. We could start on that tomorrow, except for financial considerations, and those cannot be overcome without the public, and the public won't use it until it is reliable; and so it is a rather vicious circle.

The International Convention of air navigation had its first meeting last July. France, Belgium, Japan, ourselves, Greece, Persia, China and some other small nations are represented.

We have also to get Germany and the other enemy states in as well; for at present Germany, Austria-Hungary and Bulgaria stretch across Europe and prevent us getting to the East, and unless we have an agreement allowing us to pass, then, according to International law, it is possible for these old enemy countries to prevent us flying over their country to the East. The next meeting is to be in October, and afterwards we will meet in the various capitals of the countries concerned. "It is extraordinary to know," he continued, "that today there is more mutual trust and co-operation between the various nations on that Convention than any I have ever heard of elsewhere, and I think aviation is going to be a great factor in helping to keep the peace. I am not sure that this International Convention will not be one of the biggest weapons of the League of Nations to keep things going properly."

One of the steps towards economy is the metal propeller, which is just beginning to replace the wooden one. From this, no doubt, we shall go on to complete metal construction. Designers are beginning to discover that they are getting not only better wearing machines with metal, but that by its use they save in weight. They are 20 per cent. lighter on some of these metal machines, which saving in weight can be added to the carrying load. We have also to get the variable-pitch propeller and the variable camber. When that is accomplished we will get off the ground and land with a bigger load and less horse-power.

Also in two or three years we shall be using engines that take heavy oil instead of petrol. Heavy oil costs about one-fifth the price of petrol, which will mean a great saving.

There are two dangers to be faced in the future—one the difficulty of flying over mountains, and the other the danger of collision on crowded routes.

Concluding, he said: "Air transport will pay in time. Even if it did not pay it is a necessity. If tomorrow you occupied new territory and wished to lay down a railway, or put in a cable or telegraph line, and some one proved to you that the railway would not pay for ten years, it would not stop you from doing the work. You will find the same applies to aviation, particularly in regard to the British

Empire. We shall find we must have air transport between ourselves and the British Dominions. Whether it pays or not, we must have it. In the future, the British Empire cannot remain as it is unless you quicken up communications by means of air transport."

The influence of aviation on war is remarkable. We have to realise that we have relied on our 27 miles of water all our lives. We have been able, owing to this, to avoid keeping up great armaments. Because of it we have never been invaded, and it saved us again in this last war. We have now come to the point when it protects us no longer. The Channel is practically eliminated from a war point of view. Twenty years hence and we will be in the same position as other Continental countries are today. . . .

"There is another unfortunate point about aviation as regards war. Strategists have told us that the offensive has power over the defensive on the ground. That is obvious, for if you are going to defend over one hundred miles of front, you have to cover it all. But the attacker can concentrate on a portion of the line only, say ten miles, and with the full weight of his troops break through. The defence is always beaten for that reason. In the air you have another unfortunate factor—not only have you width but you have height also. If the advantage of the offensive over the defensive is in a ratio of two to one, then to bring in the air you have a third dimension, which will probably put up the ratio to six to one. That is another ugly fact of war. Only by being able to take the offensive can we be safe, and we can only do that if we are strong in the air; and this again can only be so if we build up a great air transport industry. The R.A.F. must become the most important service. No nation will be able to afford a standing air force sufficient to meet all demands, so our air transport must provide the necessary reserve.

LONDON TERMINAL AERODROME

Monday Evening, October 2, 1922.

TODAY saw the inauguration of the new air service to Cologne by the Instone Air Line, although the venerable Vickers-Vimy, "City of London," actually left here for Cologne yesterday in order to be in Cologne to start the service from that end. Owing to thick fog at Brussels, however, she was unable to get through to Cologne the same day. This was extremely bad luck, as the machine carried a party of journalists who were "writing up" the trip. Today's London-Cologne machine, delayed by bad visibility, did not start till 1.44 p.m., and did not manage to get beyond Brussels, which was reached at 4.3 p.m.

Handley Page had full loads in both directions between London and Paris yesterday, but, owing to the bad weather, neither machine was run. The W.8 due out of Paris for London started, but had to return, and the machine from London was cancelled. Two of the passengers, however, were intent on getting to Paris that day, and engaged one of the Surrey Flying Service's "air-taxis" to fly them to Lympne to catch the cross-Channel boat at Folkestone.

Today Handley Page Transport have 15 passengers for Paris, and some of these were transferred to one of the French lines, as, under the new subsidy scheme, it does not pay to run an extra machine for a couple of passengers at £6 6s.

The Daimler Airway are continuing to run the early-morning newspaper machine to Paris for at least another fortnight, and, by arrangement with Handley Page, this machine is used by the Handley Page Transport as a "spare" for the journey from Paris to London. This arrangement should be mutually advantageous, as there are now more passengers from Paris than from London, and, with the Daimler booking office in Paris still in existence, there should be little difficulty in obtaining good loads for this machine.

The London-Berlin "Airway"

THE service which the Daimler Airway have undertaken between London and Berlin is to be opened in stages. The first stage is to open on Monday next, when a Daimler machine will leave London for Rotterdam at 9 a.m. By arrangement with the K.L.M. the time of the latter company's machine will be altered to 11.30 a.m., while the machine from Amsterdam will leave in the morning instead of in the afternoon as at present—the Daimler machine returning in the afternoon. As the fare has been cut to £4, it is hoped that there will be an increasing number of passengers using this line. The next stage of the London-Berlin route, from Rotterdam to Hamburg, will, it is expected, be opened about the end of the month.

The only machine to cross the Channel on Sunday, when the weather conditions were bad, was a "Goliath" on the C.M.A. Air Lines, which left Croydon in the afternoon and landed at Berck. As the passengers were all *en route* for Le Touquet, this was quite a satisfactory performance.

Increase in "Live Stock" Traffic by Air

THE C.M.A. Air Lines carried a consignment of live frogs from Paris to London during the week. The frogs had come by air from Budapest, and were consigned to Manchester, where they were to be used for experimental purposes, having been inoculated before they left Budapest. This line also carried 50 crates of chickens from London to Paris during the week. In fact, the traffic in "live stock" is increasing steadily on all lines.

The Instone Air Line have been having another run of bad luck recently. On Thursday last Mr. Barnard was bringing the "Vimy" back from Paris to London, loaded with spares, when he was forced to alight in a field a short distance from Le Bourget. It appears that the machine had been too heavily loaded, and, after some of the load had been removed, it was flown back to Le Bourget and started for London again the following day. It was, however, forced to descend again at Lympne, and did not reach Croydon until Saturday, when it was got ready for the initial flight to Cologne on Sunday.

Earlier in the week Mr. Bradley was flying a D.H.34 from Paris to London, with a spare Rolls engine in the cabin, and was forced to land at Berck. When attempting to leave again, he hit a telegraph pole, and, although he himself escaped with a few scratches, there was little left of the machine.

An improved type of Vickers "Viking" arrived at the aerodrome from Brooklands during the week, piloted by Capt. Broome. This machine was *en route* for Madrid to the order of the Spanish Government, and is, I understand, the first of a batch of similar machines for that country. Incidentally, I hear that the machines of this type sold to the Dutch for service in the Dutch East Indies have proved so useful that another order for the improved type has been received.

News that a big Vickers troop-transport has been flying at Farnborough is interesting because a sister machine is the Vickers 24-seater "air express," with two Napier engines. This big commercial-type Vickers machine is expected at the air-station shortly. On test, the troop-transport machine is said to have lifted a dead weight in ballast of 53,000 lbs., but I hear that she is somewhat on the slow side.

A number of air-racing enthusiasts travelled to Paris by air on Friday and Saturday to see the race for the Deutsch Cup, and were to have returned by air on Sunday had the weather been kind. One of the Daimler machines, flying from London to Paris, carried an invalid who was unable to move, a lounge being constructed for her in the cabin. The motor-car in which she arrived at the air-station was run out to the machine and the patient lifted in. I understand that the Daimler Company had placed one of their cars at her disposal in Paris in order to take her from Le Bourget to Nancy, where she is to undergo some cure.

Night-Flying between London and Paris

MAJ.-GEN. SIR W. S. BRANCKER has arranged for an experimental night air service to be run for a month between London and Paris. It is intended to start this service—probably, it is said, with an R.A.F. machine—when the hours of darkness make it possible for the aeroplane to leave Croydon at about 5 p.m., and arrive in Paris in time for dinner. The return trip will be made the following night, so that there will be alternative trips from and to London. The object of this experimental service is to ascertain the reliability of night-flying, and also to enable the insurance companies to get some idea of the risks involved, it being hoped that better rates will be quoted for night-flying machines after the experiment than is now the case.

The fine weather on Friday started a little boom in joy rides, and the Surrey Flying Services were almost as busy that day as they are on a fine Saturday. This company are pushing ahead with their programme of new Avros and D.H.9's for the extension of their activities in the spring.

Maj. Wronsky, the representative of the German Air Transport company, and Mr. Plessman, of the K.L.M., who have been in London making arrangements for the running of the London-Berlin airway, in conjunction with the Daimler Company, flew to Amsterdam on the K.L.M. morning machine on Friday, having completed the preliminary arrangements for the service. It is now expected that there will be no great obstacles in the way of the running of British "air expresses" through Germany.

ROYAL AIR FORCE

London Gazette, September 29, 1922

General Duties Branch

Group Capt. (actg. Air Commodore) A. E. Borton, C.B., C.M.G., D.S.O., A.F.C., to be Air Commodore; Oct. 1. Observer Offr. J. E. MacLennan (Lieut., Cameronians) is granted permanent commn., retaining present substantive rank and seny.; Nov. 17, 1921 (since re-classified).

The follg. Cadets, having passed through R.A.F. (Cadet) Coll., are granted perm. commns. as Pilot Offrs. with effect from, and with seny. of, Aug. 16:—L. K. Barnes, D. MacFadyen N. Vintcent, W. L. Dawson, J. E. S. Caithness, V. B. Bennett, C. H. A. Stevens, C. B. R. Pelly, S. G. Connolly, G. H. Huxham, D. L. G. Bett, M. C. Hayter, E. B. Coventry, C. B. B. Maturin, C. S. Riccard, E. A. Healy, E. A. Hodgson, C. H. Ratcliffe, E. B. Forster, A. King-Lewis, J. S. Charlton, A. G. S. Johnson, R. R. S. Waller.

Flight Lieut. H. E. P. Wigglesworth, D.S.C., is granted perm. commn., retaining his present substantive rank and seny.: Oct. 24, 1919. (*Gazette*, Oct. 24, 1919, appointing him to short service commn., is cancelled.) F. R. Offord is granted a short service commn. as Flying Offr., with effect from, and seny. of, Sept. 6. The follg. are granted short service commns. as Pilot Offrs. on probation, with effect from, and with seny. of, Sept. 9:—E. C. Roark, W. H. Ryder. The follg. Pilot Offrs. on probation are confirmed in rank:—C. F. H. Grace, E. Marler, R. L. Palmer, J. S. Phillips, H. J. Wykes; June 29. L. A. L. Firmin; July 2.

Wing Cdr. D. L. Allen, A.F.C., is placed on half-pay, Scale A, from Sept. 18 to 19 inclusive. (Substituted for *Gazette* Sept. 22.) Flight Lieut. W. J. de Salis, D.S.C., is placed on half-pay, Scale B; Sept. 28. Flying Offr. W. Catchpole, A.F.C., is placed on half-pay, Scale B, from Nov. 15, 1921, to Dec. 2, 1921, inclusive. (Substituted for *Gazette*, Dec. 20, 1921.)

The follg. Flying Offrs. are transfd. to the Reserve, with effect from the dates indicated:—Class A: J. B. Stockbridge; Sept. 16. E. Jackson; Sept. 30. Class B: G. L. G. Watson, M.M.; Sept. 19.

Observer Offr. L. Ritson is placed on retired list on account of ill-health contracted on active service, and is granted rank of Capt.; Sept. 27.

Medical Branch

The follg. are granted short service commns., in the ranks stated, with effect from, and with seny. of, Sept. 11:—

Flight Lieut.—T. McClurkin, M.B.

Flying Offr.—E. D. Gray, M.A., M.B.

G. S. Ware, M.B., is granted a temp. commn. as a Flight Lieut., with effect from, and seny. of, Sept. 11.

Temp. Lieut. A. Rhodes, L.D.S., Gen. List, is granted temp. commn. as Flying Offr. while attached to R.A.F. from Army for Dental duties; Sept. 14. He will continue to receive emoluments from Army funds.

Nursing Service

Sister M. Welch to be Matron; Sept. 13.

Sister K. C. Watt to be actg. Matron: Sept. 13.

August Continental Air Traffic

FROM the Air Ministry we learn that traffic on the Continental airways reached a record figure during the month of August. Not only did the numbers of machines flying to and from Croydon surpass any previous monthly figure, but the numbers of passengers travelling by air and the weight of goods transported also exceeded the highest totals hitherto recorded.

As compared with July, when the passengers on all routes were, 1,591, the August travellers increased by more than 1,000, the exact number using air services being 2,682, of which 82 per cent. were carried by the British companies, while the French and Dutch companies received about 18 per cent. A year ago the British companies' proportion was just over 45 per cent., so that there is not merely an increase in numbers, but also clear indications of the preference of air travellers for British-operated services. The number carried by British lines was 2,203. The weight of air-borne goods also rose to 77·8 tons, an increase of several tons on the July figures, which were a record. A special feature of this traffic was that there was a daily average of slightly more than 1 ton of newspapers from London to the Continent during the month. Nearly the whole of the outgoing newspapers were carried by British aircraft. Incoming newspaper traffic was small in proportion, but the total newspaper traffic, weighing 37·4 tons, formed the largest class of goods transported by air. Other goods traffic amounted to 40·4 tons, of which British and French machines each took 17 tons. Dutch aircraft carried in all 6·4 tons.

The number of machines flying on the Paris, Brussels and Rotterdam services increased to 912 from 711 in July, a figure which was itself a record. The daily average of machines was therefore over 30. British companies operated 598 of the total, while French firms' machines numbered 210 and the Dutch company accounted for the remainder of 104. The number of departures from the London Terminal Aerodrome, Croydon, was 457, and the arrivals 455.

The efficiency of British-operated machines was again very high, over 95 per cent. of the flights by British aeroplanes on the London-Paris route being completed within the stipulated period of four hours, while practically 90 per cent. of the flights were made in less than three hours. The percentage of useful passenger accommodation and general cargo space utilised during the month on British aircraft was 48 per cent., which is a slight increase on the proportion during July.

The approximate distance flown by aircraft during the period was 185,000 miles, of which 115,000 miles were covered by British machines.

There were no casualties or injuries to passengers or crews during the month.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association.)

ON Friday, October 6, an Extraordinary General Meeting will be held at Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, at 7.30 p.m.

On Saturday last, September 30, the Competition for Mr. Felix Kelly's Cup was held on Wimbledon Common, and Mr. D. A. Pavely won same with a splendid flight of 70 secs. Mr. Rippon was second.

Mr. Pavely. Type O-P'-1-1. First flight, 59 secs.; second flight, 70 secs.; third flight, 68⅝ secs.

Mr. Rippon. Type O-1-P'-1. First flight, 18⅝ secs.; second flight, 29 secs.; third flight, 32⅝ secs.

On Sunday, October 22, a Special Flying Demonstration will be given by the members at Bunkers Hill (Hamsptead Heath Extension), at 11 a.m., and it is hoped members will make a special effort to be present with their models.

On October 29, competition for Mr. Pilcher's Challenge Cup. Full particulars in FLIGHT, September 28.

At the meeting held on Friday last at Headquarters an interesting discussion took place on Model Gliding, Dr. Hankin being present. He emphasised the great need of practising gliding in descending currents, thus obtaining true soaring. The machines should have the centre of gravity behind the centre of pressure. He also very kindly offered prizes of £1, 15*s*., and 10*s*. for a Glider Competition, to be contested under the following conditions:—

1. Glides to be made up-wind, the winning glide to be at least 200 yards in length.
2. The models must pass between or over two posts placed 30 yards apart and 200 yards from starting point.
3. The ground chosen to be either level or slightly uphill.
4. To ensure good comparative results all models to have 1½ sq. ft. of horizontal surface (planes and tail).
5. To be held Nov. 26, on Wimbledon Common at 12 noon.
6. All models must be hand launched.

Mr. Levy very kindly offered a Consolation Prize of 5*s*. in the event of Dr. Hankin's prize not being won.

A. E. Jones, Hon. Sec., 48, Narcissus Road, West Hampstead, N.W. 6.

SIDE-WIND

THE Rolls-Royce car has long been considered a kind of super-vehicle and a model for comparison; indeed the term "Rolls-Royce" has almost become a synonym of super-excellence in any department of luxury manufacture. The fact that the Rolls-Royce Company have decided to produce a smaller model has come as a piece of particularly interesting news, and the *élite* of motordom will be all agog to see the new and lower-powered vehicle. It is, of course, a "six," and follows the general lines of conventional design, but incorporates the wonderful workmanship and pleasing outline, together with beautiful balance and smooth running and acceleration, which have made the Rolls-Royce the criterion of car luxury. The new car has cylinders 3-in. bore by 4½-in. stroke, and shows an R.A.C. rating of 21·6 h.p. The output will be limited in quantity. The chassis price has been fixed at £1,100, and the open touring car will cost £1,590. There will also be a landaulet at £1,745, a limousine at the same price, a cabriolet (owner drive) at £1,880 and a chauffeur-driven cabriolet at £1,900. The equipment includes lamps, speedometer, clock, spare tyre, wind horn and mascot. They will be seen at the show-rooms of Rolls-Royce, Ltd., at 14-15, Conduit Street, London, W. 1.

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